Joint Service Specification Guides as a Systems Engineering Tool

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Harold J. Hinkle

Naval Air Systems Command

Patuxent River, MD

Topics

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- Requirements flowdown
- Future plans

JSSG Background

In 1970's DoD and the Defense Science Board investigated cost of acquisition development programs

- **cited blanket application of unbounded sub-tiering of development specifications**
- **determined specification and standard documents dictated design solutions rather than functional needs**

Old versus New

SD-24

3.13.2.2.3 Nuts

"For application temperatures up to 250 deg F, nuts shall be as specified in MS-21224, MS-17825 or Ms-17826. For application temperatures up to 450 deg F, nuts shall be as specified in MS-21244. All nuts, except self-locking nuts and nuts for machine screws, shall be locked by cotter pins or safety wire as specified in MS-33540. Shear or other thin type nuts, that have fewer complete threads than the standard full height castellated type, shall not be used in primary structures in which the principal bolt loads are tensile or where high tensile stresses are required to maintain tightness or rigidity of the assembly. For such applications, standard full height nuts shall be used. Plain or self-locking nuts used in any joint that serves as an axis of rotation, transmits motion, or serves as a primary load path with less than three bolts shall be secured by positive type mechanical locking devices……"

Air Vehicle JSSG

3.1.4 Reliability

The air vehicle shall meet the following mission reliability requirement: __(1)__. The air vehicle shall meet the following logistics reliability requirement: __(2)__.

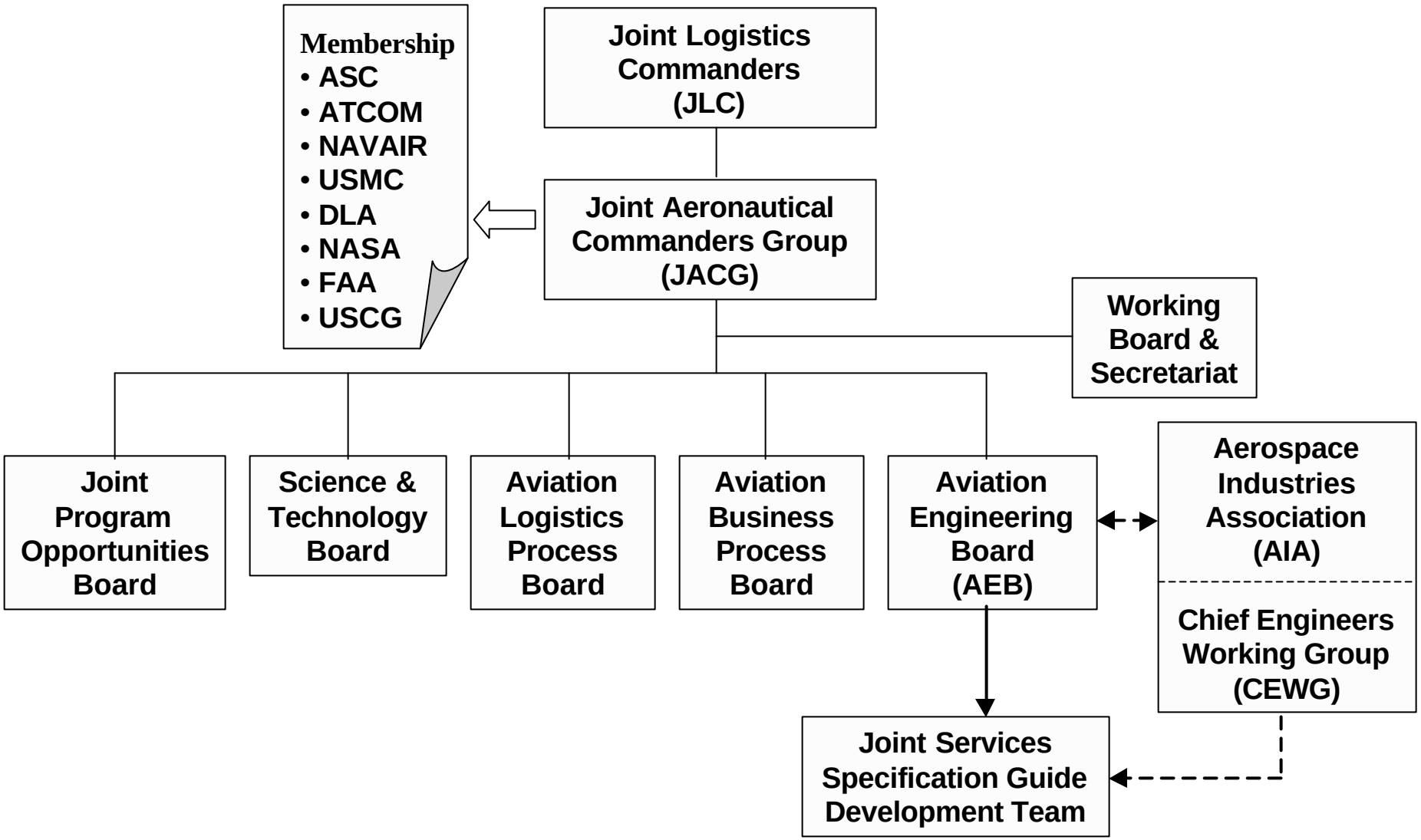
3.1.5 Maintainability

The air vehicle shall be capable of being maintained in operationally ready condition within the repair time and maintenance manpower requirements specified when operated and maintained by appropriately skilled personnel, using prescribed procedures, support equipment, and resources, in the environment and operational usage defined herein. Maintenance Repair Time shall be __(1)__. Maintenance Manpower shall be __(2)__.

JSSG Background-cont'd

- **June 1994 memorandum from Secretary of Defense: "*Specifications & Standards - A New Way of Doing Business*"**
  - **set in motion acquisition reform initiatives**
  - **requires procuring activity to specify "performance required", NOT "how to achieve performance"**
  - **gives developers more authority, responsibility, and accountability for design**
- **JACG/AEB directed development of Joint Service Specification Guides for aviation acquisitions**
  - **joint service specification guidance**
  - **strong support from Aerospace Industries Association (AIA)**
  - **consistent with Performance Based Business Environment (PBBE)**

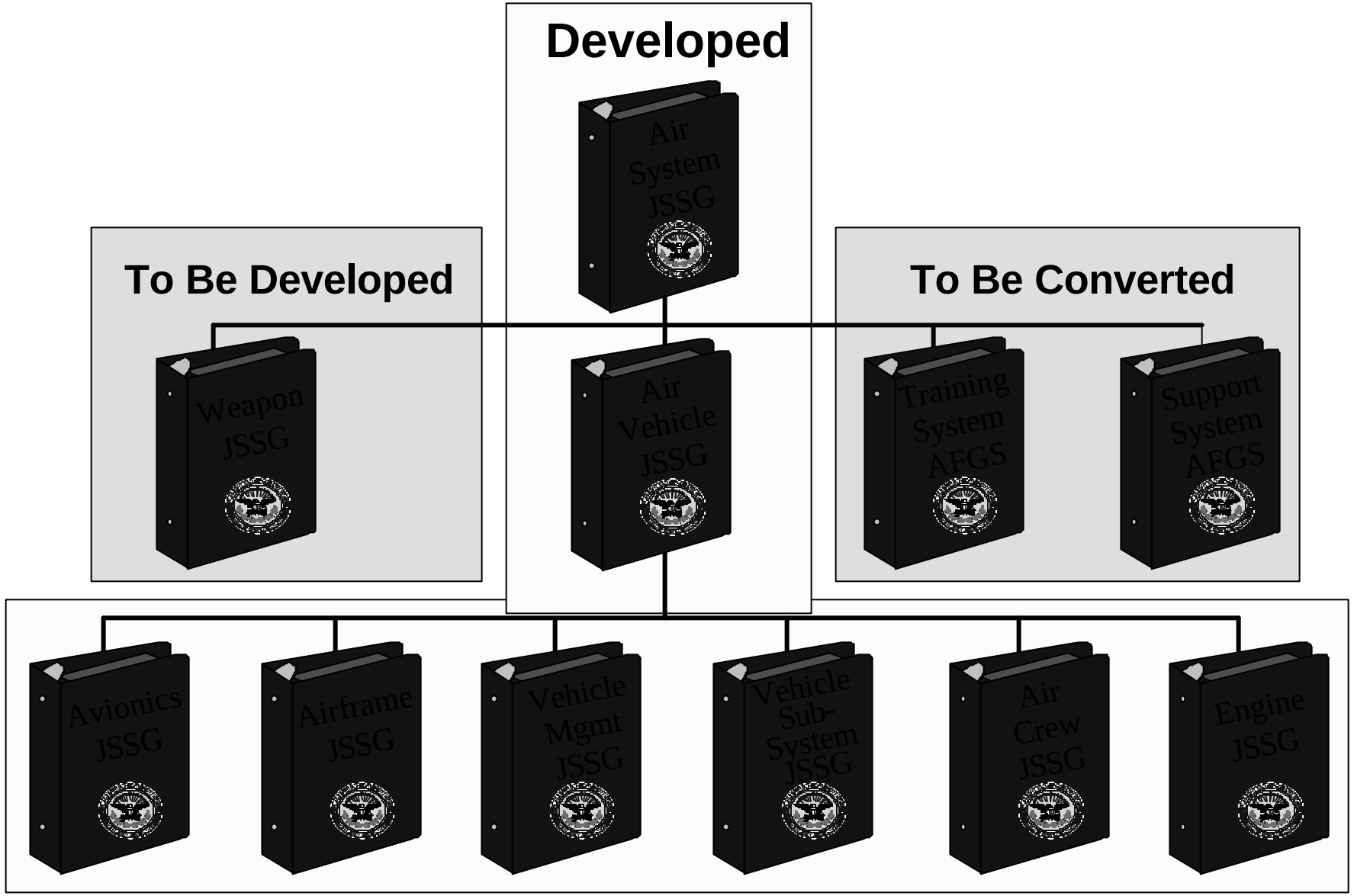
JSSG Sponsorship



JSSG Description

- **Tailorable performance-based guides**
  - **starting point for a program-unique specification**
  - **facilitates joint programs**
  - **provides single face to industry for common requirements**
- **Applicable to aviation sector**
  - **fixed wing air vehicles**
  - **rotary wing air vehicles (limited in present edition)**
  - **UAVs (in future editions)**
- **Eight JSSGs created**
  - **Tier I: Air System**
  - **Tier II: Air Vehicle**
  - **Tier III: Avionics, Air Vehicle Subsystems, Vehicle Control Management Systems, Structures, and Aircrew Systems**

Joint Service Specification Guide Tree



JSSG Purpose

Assist government and industry engineering program teams in the preparation of program-unique specifications

- **guidance to help select and tailor generic specifications**
- **verifications to help ensure appropriate system maturity at program milestones**
- **highlight lessons learned from previous programs to help avoid past pitfalls**

JSSG Format

- **Generic guides with a complete set of performance and verification requirements**
  - **blanks in place of numerical requirements**
  - **comprehensive with respect to missions**
  - **incremental test methods/verification requirements**
- **Guidance for tailoring out unnecessary requirements**
  - **use only those requirements suitable for the particular program under development**

Current JSSG Status

- **JSSGs are available via DODISS**
  - **Tier III JSSGs published 30 Oct 98**
  - **Tier I and II published 1 May 00**
  - **Navy/Army/Air Force SAEs have endorsed use of JSSGs via letter to each aviation PEO**
- **Tier I and II Section 3 (Requirements) complete for fixed wing, tactical applications (JSF)**
- **Current emphasis is on Section 4 (Incremental Verifications) for Tier I and Tier II**
- **Requirements functional flowdown completed**
  - **Tier I and Tier II requirements revised**
  - **Tier II to Tier III connectivity needs work**

Functional Flowdown Example

Air System JSSG

- **System Survivability**
  - -Mission and One-on-One Survivability
  - -Parked Aircraft and Ground Support Survivability

Air Vehicle JSSG

- **Survivability**
  - –**Susceptibility**
    - **Signature Requirements**
      - –RADAR Cross Section
      - –Infrared Signature
      - –Visual Signature
      - –Acoustic Signature
      - –Emission Control
      - –Electronic Protection
  - –**Vulnerability Reduction**
    - **Threat Detection, ID, Prioritization**
    - **Defensive Countermeasures**
    - **Terrain Following/Terrain Avoidance**
    - **Ballistic Threat Survivability**
    - **Directed Energy Threat Survivability**
      - –Electromagnetic Threat Survivability
      - –Laser Threat Survivability
    - **Chemical and Biological Threat Survivability**
      - –Chemical and Biological Hardening
      - –Chemical and Biological Personnel Protection
      - –Chemical and Biological Decontamination
      - –Chemical and Biological Detection
    - **Nuclear Weapons Survivability**

Functional Flowdown Example - cont'd

Air System JSSG

System Survivability

- **Mission and One-on-One Survivability**

  The mission survivability of the air system shall meet or exceed the probability of survival specified in Table 3.1.6.2.1-I for the missions, scenarios, vignettes, mission phases and conditions shown.

Table 3.1.6.2.1-I. Mission Survivability

Air Vehicle JSSG

Survivability

- **Susceptibility**
  - **Signature Requirements**
    - **Radar Cross Section**

      The RCS signature shall not exceed _(1)__.

      .
      .
      .
    - **Emission Control**

      Emission Control shall have the capability to inhibit unintentional electromagnetic radiated emissions to levels less than __(1) __at a distance of __(2)__ in any direction from the air vehicle over the frequency range of __(3)__. The air vehicle shall be capable of activation and deactivation of the Emission Control (EMCON) function via a single control instruction.

Future Plans

- **Complete Section 4 (Verification) for Tier I and II**
- **Complete flowdown of requirements to Tier III**
  - **improve connectivity between Tier II and III**
  - **revise Tier III documents based on results of flowdown**
- **Revise Tier III Section 4**
- **Add UAV requirements**
- **Add rotary wing applications**

Summary

- **Joint Services Specification Guides are a direct product of acquisition reform that will:**
  - **streamline specification development**
  - **improve communications between the government and industry**
  - **take advantage of commercial quality improvements and advances in technology and processes**

Questions or comments?

Contact: Hank Hinkle

Naval Air Systems Command

(AIR 4.1C)

22347 Cedar Point Road, Unit 6

Bldg 2185, Suite 2140

Patuxent River, MD 20670-1161

301-342-7073

(hinklehj@navair.navy.mil)